Rectifier Diode
W2958NC280 to W2958NC350

The data sheet on the subsequent pages of this document is a scanned copy of existing data for this product.
(Rating Report 94DR01 Issue 2)

This data reflects the old part number for this product which is: SW24-32CXC12C. This part number must **NOT** be used for ordering purposes – please use the ordering particulars detailed below.

The limitations of this data are as follows:
No reverse recovery information available
Device no longer available for grades 24 & 26 (2400V & 2600V V_{RRM})

Please use the following link to view an up to date outline drawing for this device
Outline W5

Where any information on the product matrix page differs from that in the following data, the product matrix must be considered correct

An electronic data sheet for this product is presently in preparation.

For further information on this product, please contact your local ASM or distributor.

Alternatively, please contact Westcode as detailed below.

Ordering Particulars			
W2958	NC	♦♦	**0**
Fixed Type Code	Fixed Outline Code	Voltage code V_{RRM}/100 28-35	Fixed Code
Typical Order Code: W2958NC300, 26.6mm clamp height, 3000V V_{RRM}			

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QUALITY AND EVALUATION LABORATORY

Rating Report No: 94DR01 Issue 2 Date: 22nd September , 1995

Origin: Q.E.L. PAR94042 Pages: 14

Diode Capsule Type : SW24-32CXC12C

Written by: M Baker Checked: M. Short. Approved: 5/9/94.

This diode consists of a diffused 53 mm diameter silicon slice, reference DPLXC, mounted in a cold weld capsule.

This issue supersedes Rating Report 94DR01 Issue 1 dated 31st August, 1994.

Ratings

Voltage Grades) A blocking voltage derating factor) of 0.13% per deg. Celsius is applicable		: 24 - 32
V_{RSM}	) to this device for T_j below 25°C	: 2500 - 3300 V
V_{RRM}	)	: 2400 - 3200 V

$I_{F(AV)}$: Single phase: 50 Hz, 180° half sinewave;

Double Side Cooled T_{HS} = 55 °C, 100 °C	: 2960 A, 2190A
Single Side Cooled T_{HS} = 100 °C	: 1370A
$I_{F(rms)}$ T_{HS} = 25°C)) Double side cooled	: 5340 A
I_F T_{HS} = 25°C)	: 4710 A
I_{FSM} : t = 10ms half sinewave; T_J (initial) = 175 °C V_{RM} = 0.6$V_{RRM(MAX)}$	: 28 kA
I_{FSM} : t = 10ms half sinewave; T_J (initial) = 175 °C V_{RM} ≤10V	: 31 kA
I^2t : t = 10ms; T_J (initial) = 175 °C; V_{RM} = 0.6V_{RRM}(MAX)	: 3.92 x$10^6$$A^2$s
I^2t : t = 10ms; T_J (initial) = 175 °C; V_{RM} ≤ 10V	: 4.81 x$10^6$$A^2$s
I^2t : t = 3ms; T_J (initial) = 175 °C; V_{RM} ≤ 10V	: 3.55 x$10^6$$A^2$s
T_{HS}: Operating Range	: -40 To +175 °C
T_{stg} : Non-operating	: -55 To +175 °C

Characteristics (Maximum values unless otherwise stated)

V_O	: 0.807 V
r_S	: 0.167 mΩ
A : T_J = 25°C	: 0.959448
B : T_J = 25°C	: -8.522406E-2
C : T_J = 25°C	: -2.260943E-5
D : T_J = 25°C	: 2.010206E-2
A)	: 0.742850
B) $V_F = A + B.\ln(i_F) + C.i_F + D\sqrt{i_F}$	: -3.696154E-2
C)	: 6.675652E-5
D)	: 1.209331E-2
V_{FM} at I_{FM} = 3800 A	: 1.44 V
$R_{th(J-HS)}$ Double side cooled	: 0.02 K/W
Single side cooled	: 0.04 K/W
I_{RRM} : at $V_{RRM(MAX)}$	: 60 mA
V_{fr} : at dI/dt =	: ---
Reverse recovery at I_{FM} = A; t_p = μs di_R/dt = A/μs; V_{RM} = V	: ---
Q_{RR} (total area)	: ---
Q_{RA} (50% chord)	: ---
t_{rr} (50% chord)	: ---
I_{RM}	: ---
Mounting Force	: 19 - 26 kN (1900 - 2600 kg.f)
Outline Drawing	: 100A249
JEDEC Outline No.	: ---

NOTE: All characteristics are at $T_{VJ} = T_{Jmax}$ operating unless stated otherwise.

CONTENTS

	Page
Ratings	1
Characteristics	2
Contents	3
Voltage Ratings	4
Computer Modelling Parameters	5 - 8
Dissipation and Heatsink Temperature vs Mean Current	9 & 10
Limit Forward Voltage Characteristic	11
Transient Thermal Impedance Characteristic	12
Surge Current and I^2t vs Duration of Surge	13
Outline Drawing	14

Changes to 94DR01 Issue 1

Page 1	$I_{F(AV)}$, $I_{F(rms)}$, $I_{F(dc)}$.
Page 2	V_o, r_s, ABCD co-efficients, V_t.
Page 3	Contents changed, modification list added.
Pages 5-8	New pages of computer modeling data added.
Page 9-13	Rating graphs redrawn.

Voltage Ratings

Voltage Class	V_{RRM} V	V_{RSM} V
24	2400	2500
26	2600	2700
28	2800	2900
30	3000	3100
32	3200	3300

1. This Report is applicable to higher or lower voltage grades when supply has been agreed by Sales/Production.

2. A blocking voltage derating factor of 0.13% per deg. Celsius is applicable to this device for T_J below 25°C.

Computer Modelling Parameters

1. Device Dissipation Calculations

$$I_{AV} = \frac{-V_0 + \sqrt{V_0^2 - 4*ff^2*r_s*(-W_{AV})}}{2*ff^2*r_s}$$

Where V_o= 0.807 V, r_s=0.167 mΩ

$$W_{AV} = \frac{\Delta T}{R_{th}}, \quad \Delta T = t_{JMax} - t_{HS}$$

R_{th} = Supplementary thermal impedance, see table below.

ff = Form factor, see table below.

Supplementary Thermal Impedance						
Conduction Angle	30°	60°	90°	120°	180°	d.c.
Squarewave Double Side Cooled	0.0228	0.0224	0.0220	0.0217	0.0211	0.0200
Squarewave Single Side Cooled	0.0453	0.0444	0.0437	0.0431	0.0422	0.0400
Sinewave Double Side Cooled	0.0224	0.0219	0.0216	0.0213	0.0200	
Sinewave Single Side Cooled	0.0432	0.0426	0.0422	0.0419	0.0400	

Form Factors						
Conduction Angle	30°	60°	90°	120°	180°	d.c.
Squarewave	3.46	2.45	2	1.73	1.41	1
Sinewave	3.98	2.78	2.22	1.88	1.57	

2. Calculating V_f using ABCD Coefficients

The on-state characteristic I_f vs V_f, on page 11 is represented in two ways; (i) the well established V_o and r_s tangent used for rating purposes and (ii) a set of constants A, B, C, D, forming the co-efficients of the representative equation for V_f in terms of i_f given below:

$$V_f = A + B * \ln(I_f) + C * (I_f) + D * \sqrt{I_f}$$

The constants, derived by curve fitting software, are given in this report for both hot and cold characteristics where possible. The resulting values for V_f agree with the true device characteristic over a current range which is limited to that plotted.

125°C Coefficients		25°C Coefficients	
A	0.74285	A	0.959448
B	-3.696154E-2	B	-8.522406E-2
C	6.675652E-5	C	-2.260943E-5
D	1.209331E-2	D	2.010206E-2

3. Thermal Impedance Calculation

$$r_t = \sum_{p=1}^{p=n} r_p\left(1 - e^{-\frac{t}{\tau p}}\right)$$

Where p = 1 to n, n is the number of terms in the series.

t = Duration of heating pulse in seconds.

r_t = Thermal resistance at time t.

r_p = Amplitude of *pth* term.

τ_p = Time Constant of *pth* term.

D.C. Double Side Cooled				
Term	1	2	3	
r_p	1.224814E-2	5.527518E-3	2.061607E-3	
τ_p	1.022926E+0	1.277288E-1	9.696797E-3	

D.C. Single Side Cooled				
Term	1	2	3	4
r_p	2.842996E-2	6.635481E-3	4.088585E-3	1.378510E-3
τ_p	5.481154E+0	4.738482E-1	7.379005E-2	6.966137E-3

4. Recovery Parameter Estimation

Typical peak recovery current
May be calculated, using the expression;

$$I_{RM} = k * (di_R/dt)^i$$

Where I_{RM} = peak recovery current, k and i are constants see table.
di_R/dt should be in the normal operating range of the device (5 - 100 A/μs).

I_{TM} (A)	k	i
200	51.2585	0.517264
400	58.8562	0.518194
700	63.9606	0.518034
1000	68.1566	0.514907

Typical recovered charge and recovery time may be calculated, using the polynomial expression;

$$y = \sum_{p=0}^{p=n-1} k_p (di_R/dt)^p$$

Where y = recovery parameter,
k_p = coefficient found in the table below,
n = number of terms in the series,
p = term number

Total Recovered Charge

Values of k_p for I_{FM}				
p	200 A	400 A	700 A	1000 A
5	1.579247E-5	1.577448E-5	1.670940E-5	1.146349E-5
4	-4.072192E-3	-4.138064E-3	-4.406054E-3	-3.138094E-3
3	3.835333E-1	4.021875E-1	4.268419E-1	3.194691E-1
2	-1.643314E+1	-1.829472E+1	-1.914125E+1	-1.539102E+1
1	3.347082E+2	4.194912E+2	4.443590E+2	4.046201E+2
0	2.421842E+3	2.272175E+3	2.356083E+3	2.473667E+3

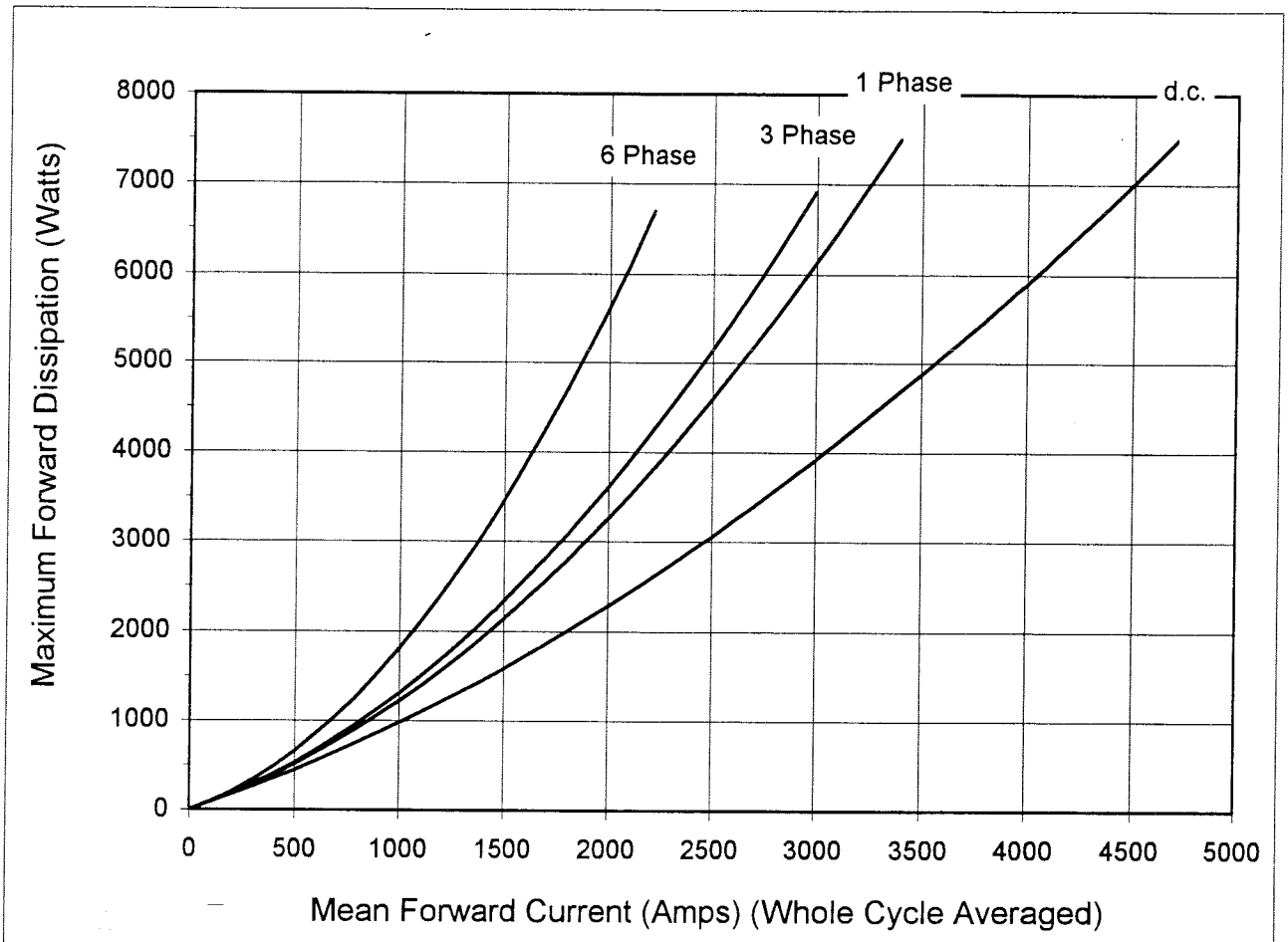
Q_{RA} Recovered charge at 50 % chord

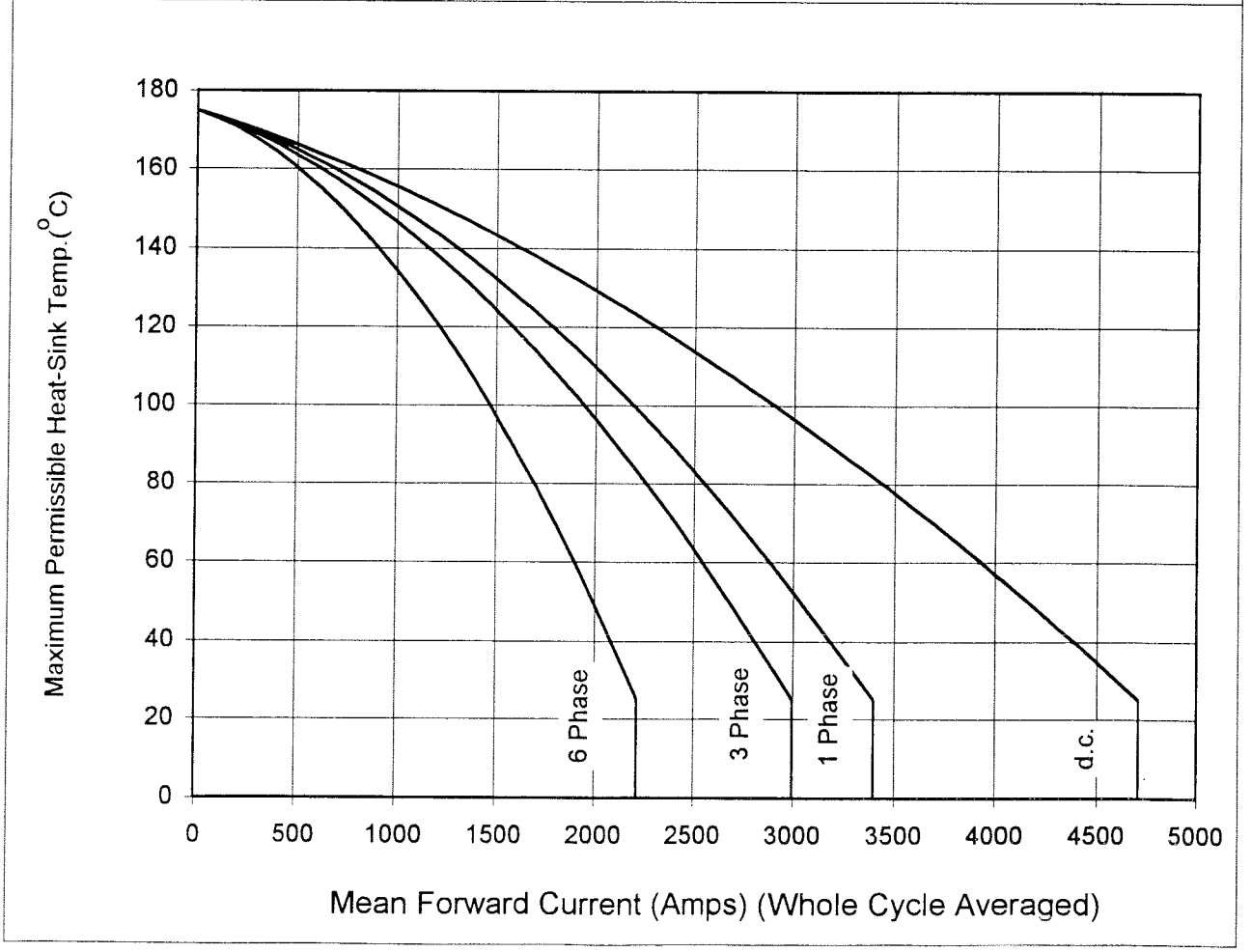
Values of k_p for I_{FM}				
p	200 A	400 A	700 A	1000 A
5	9.41521E-6	9.69561E-6	1.14335E-5	1.03261E-5
4	-2.36676E-3	-2.52020E-3	-2.95282E-3	-2.66765E-3
3	2.14404E-1	2.40823E-1	2.79800E-1	2.53273E-1
2	-8.54896E+0	-1.05448E+1	-1.21642E+1	-1.11304E+1
1	1.36969E+2	2.08566E+2	2.46812E+2	2.37435E+2
0	2.48353E+3	2.25223E+3	2.17688E+3	2.20106E+3

t_{rr} Recovery time

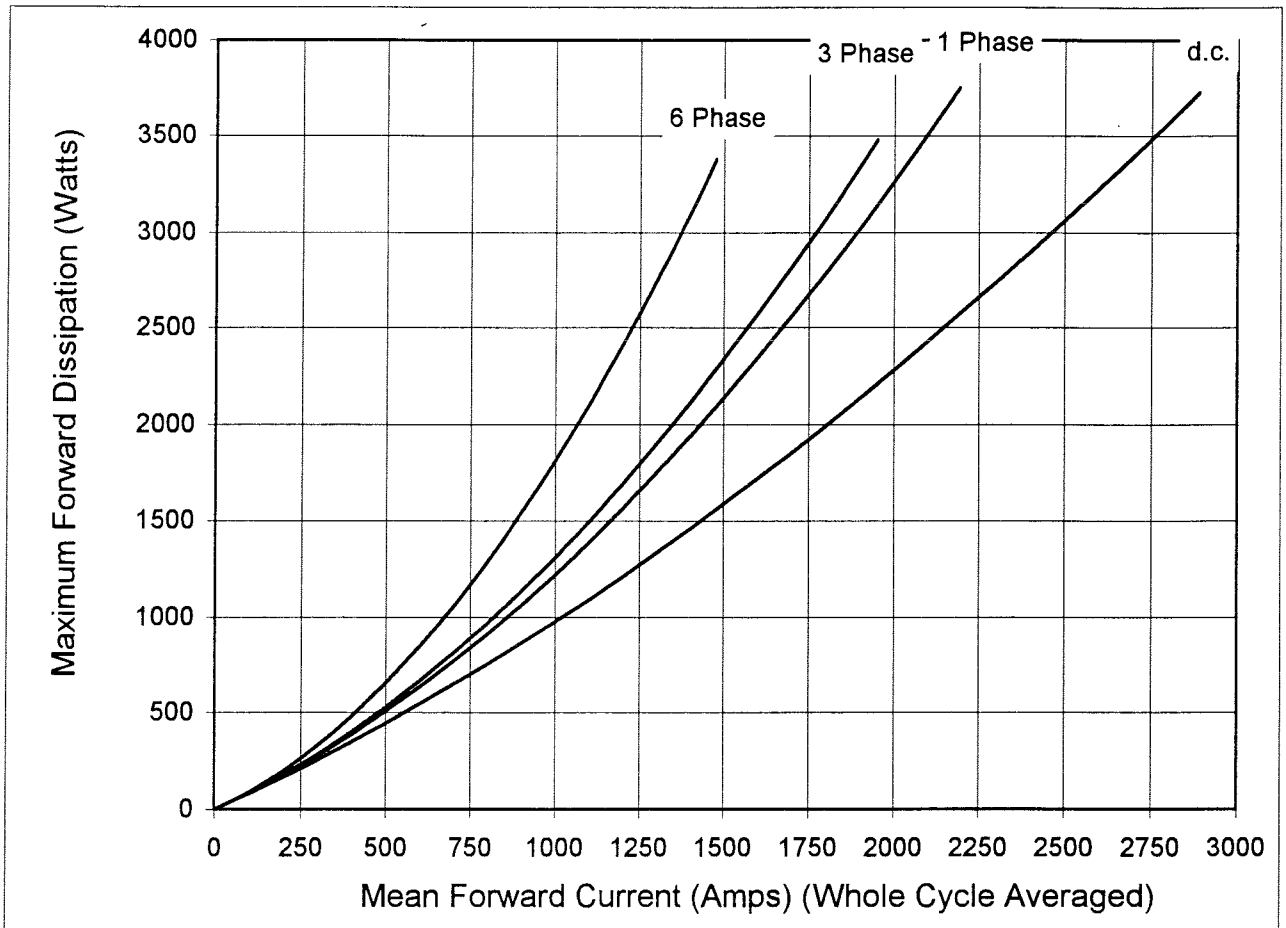
Values of k_p for I_{FM}				
p	200 A	400 A	700 A	1000 A
5	-3.15482E-7	-8.39966E-7	-8.31642E-7	-8.27357E-7
4	8.093534E-5	2.033969E-4	2.015142E-4	2.00624E-4
3	-7.560806E-3	-1.726540E-2	-1.712950E-2	-1.70702E-2
2	3.199223E-1	6.172576E-1	6.139875E-1	6.12608E-1
1	-6.421334+0	-9.18514+0	-9.153875E+0	-9.14198E+0
0	7.450412+1	8.201481E+1	8.193753E+1	8.19057E+1

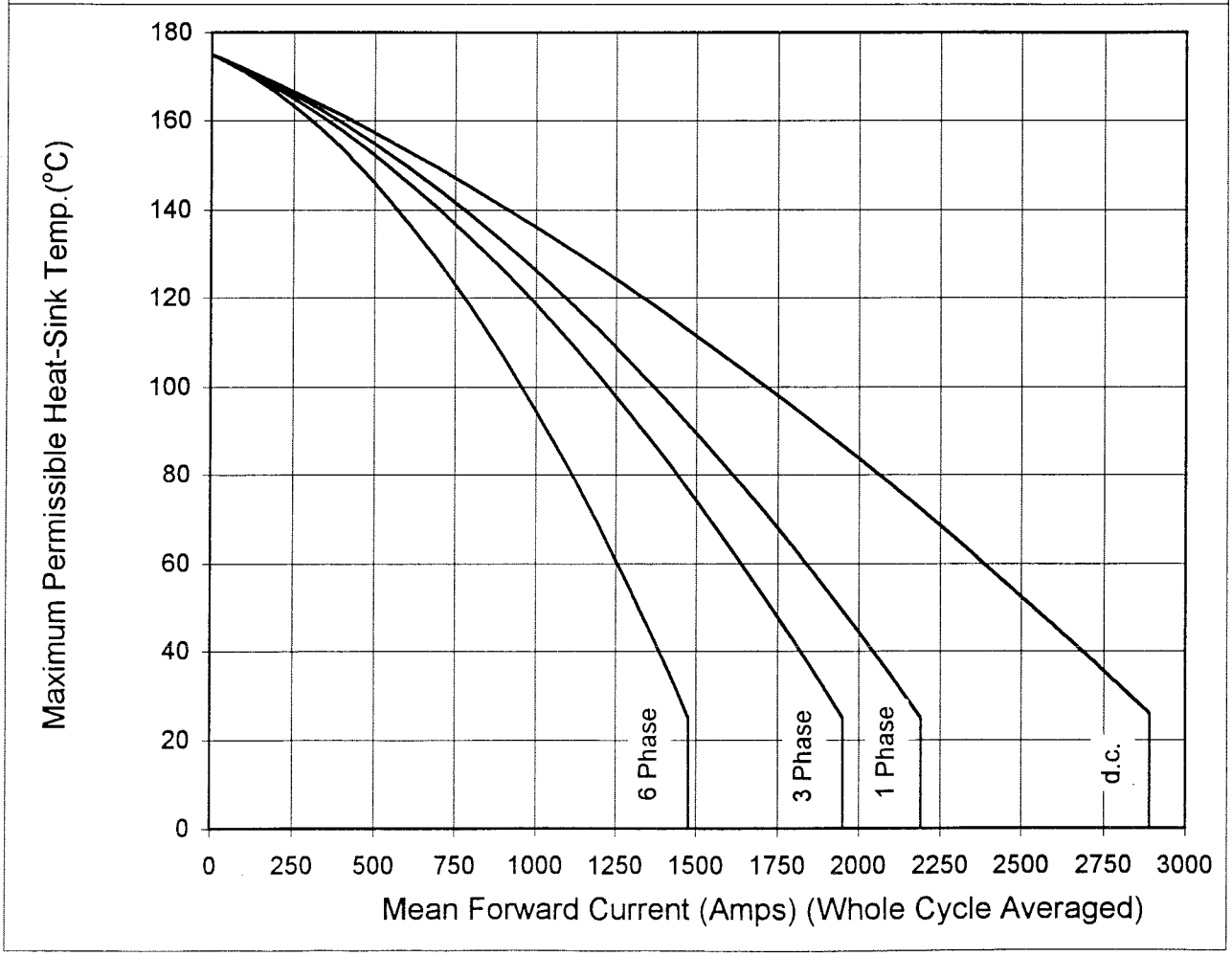
Double Side Cooled



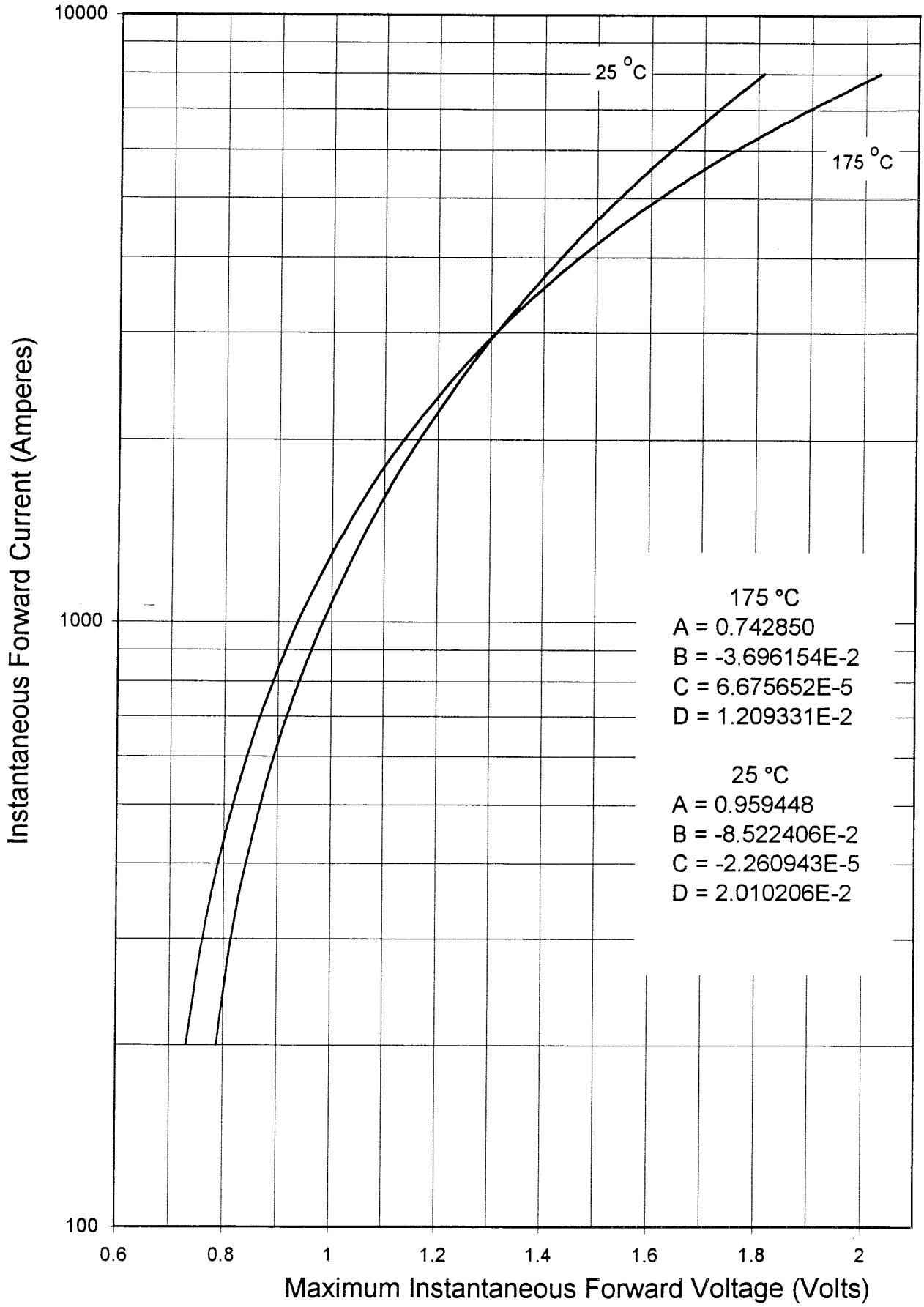


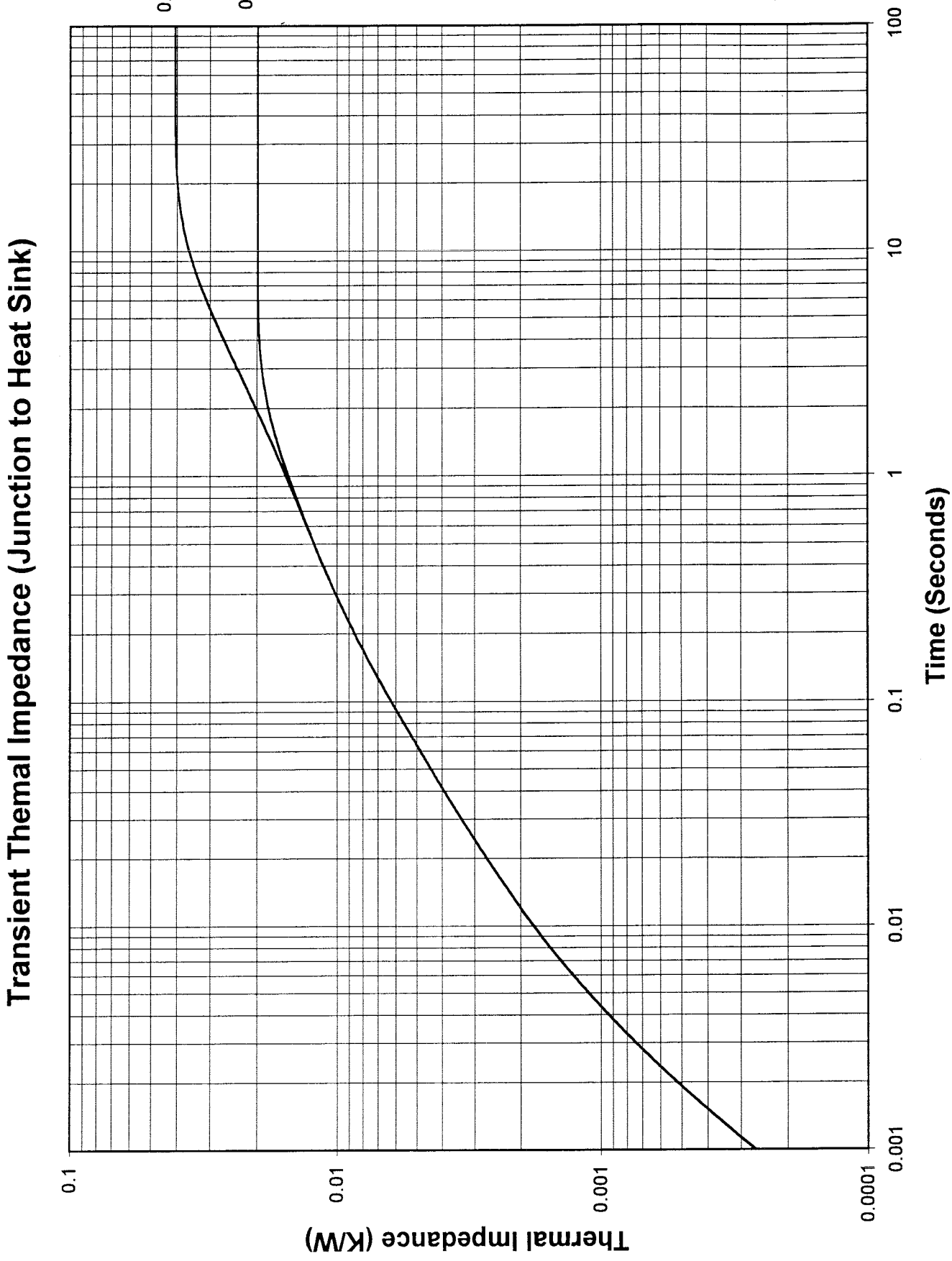
Single Side Cooled



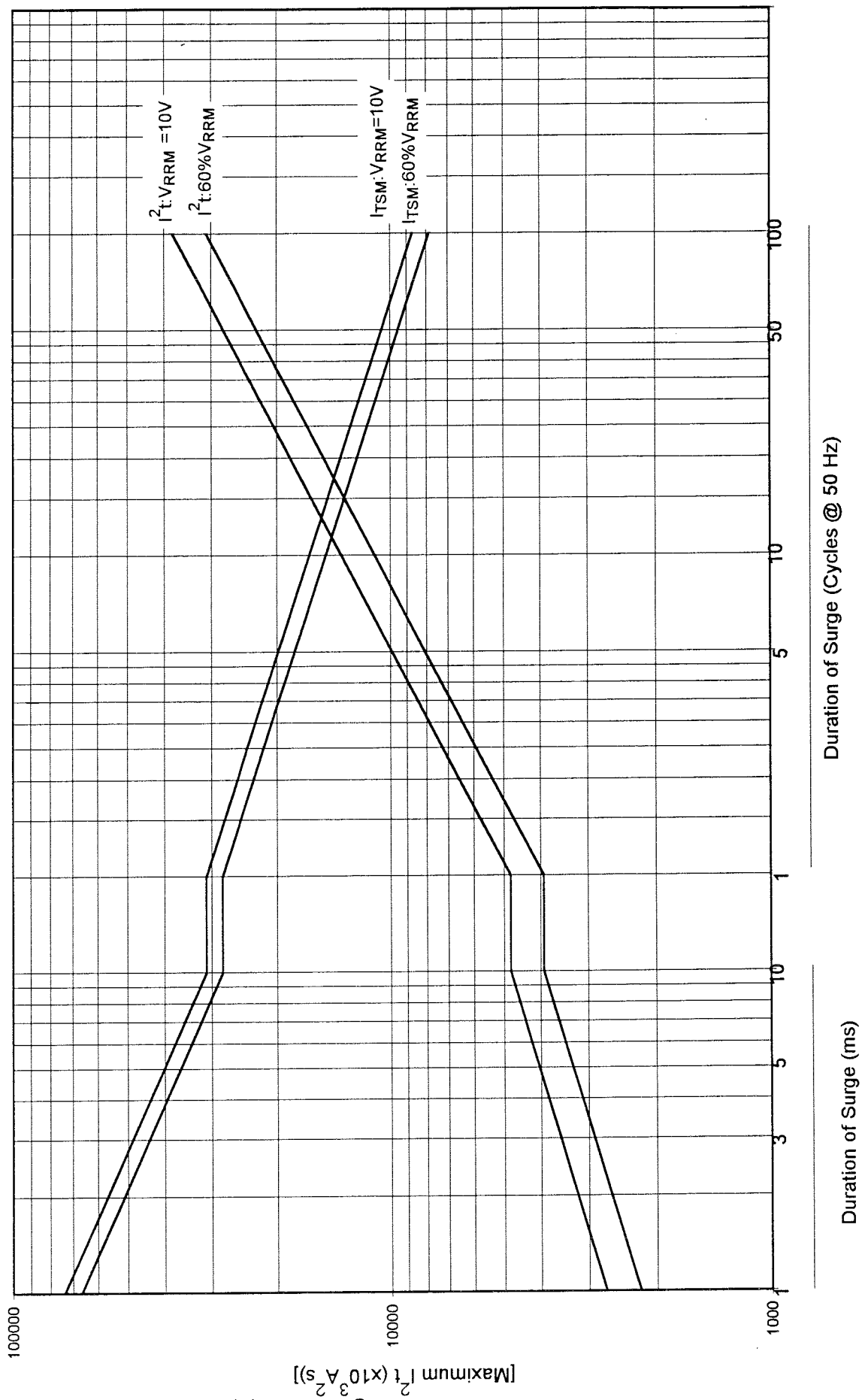


On-State Characteristic of Limit Device




Transient Themal Impedance (Junction to Heat Sink)
0.04 K/W
S.S.C.
0.02 K/W
D.S.C.
Thermal Impedance (K/W)
0.1
0.01
0.001
0.0001
Time (Seconds)
0.001
0.01
0.1
1
10
100

Maximum Non-Repetitive Surge Current
@ Initial Junction Temperature 175 °C

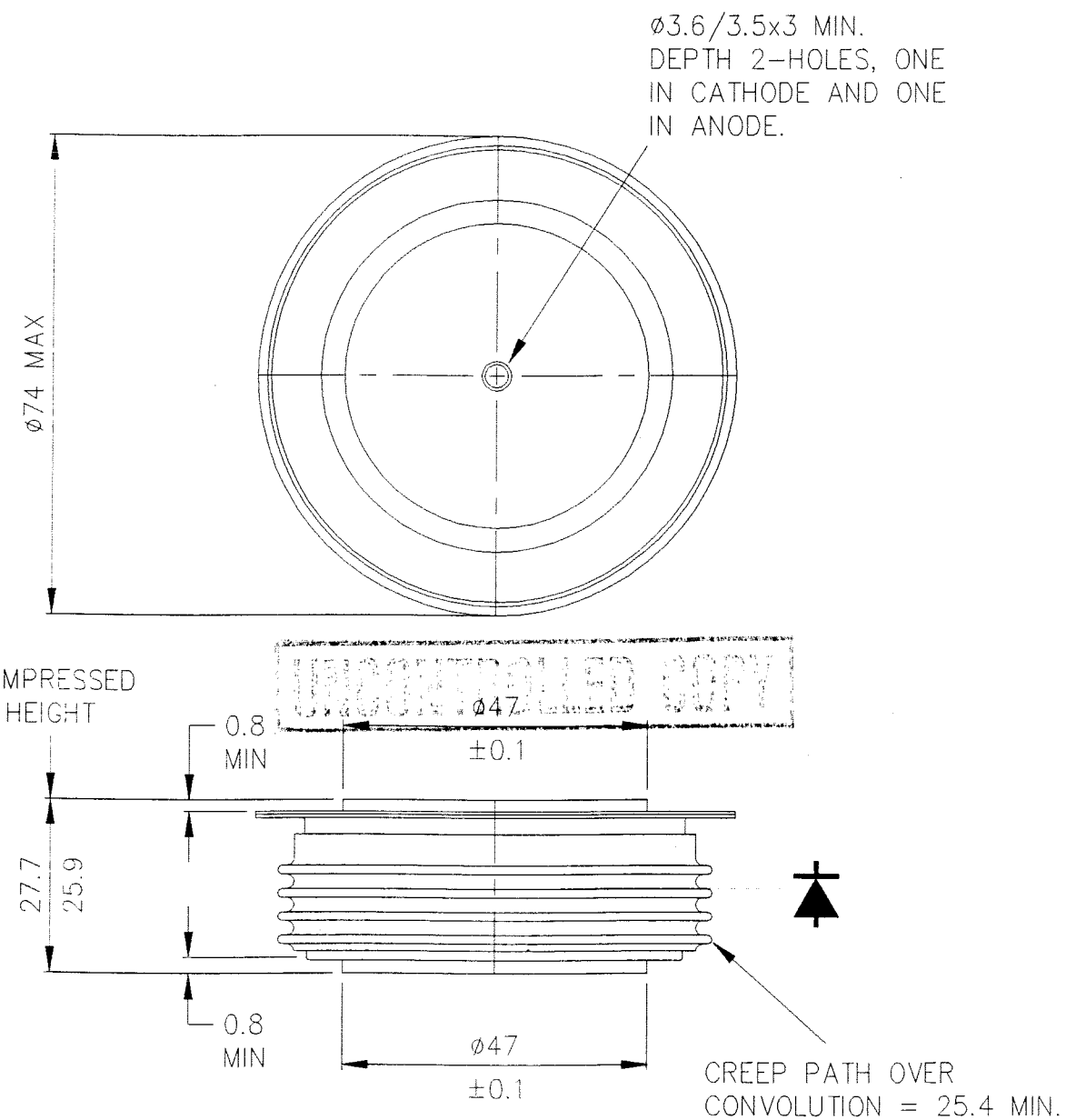


INTERNATIONAL OUTLINE No. DO-200AC
G.A. DWG No. 159B100H350-H359
WEIGHT. 480 GRAMS
FINISH. NICKEL PLATE

DEVICE MOUNTING: CLAMPING FORCE TO BE APPLIED ON CENTRE LINE OF LOCATION HOLES AND BE EVENLY DISTRIBUTED OVER AREA OF CONTACT. FLAT TOL. ON SURFACES TO WHICH DEVICE IS CLAMPED TO BE 0.04 WIDE. CLAMPING FORCE = 1900-2600kgf. (19-26kN).

-14-

TYPE NUMBER		
CXC334	CXC680	CXC950
CXC500	CXC815	CXC990
CXC504	CXC818	CXC1170
CXC574	CXC820	CXC11C
CXC604	CXC824	CXC12C
CXC614	CXC915	CXC14C
CXC620	CXC930	CXC19C
CXC624	CXC924	



ISS	REVISIONS	
4	11-09-90 REDRAWN ON CAD HDN	
5A	TYPE No.'s CXC504, 574, 604 & 614 ADDED. M1944 21.7.92.	
6D	30.6.93. M2266. TYPE's CXC334 & CXC344 ADDED. HN	
7D	26.8.93. M2313. CXC19C ADDED. HN.	
8D	2.12.93. M2439. CXC915 ADDED. HN.	
9D	10.1.94. M2408. CXC344 DELETED CLAMPING FORCE IN kN ADDED. HN	
10 D	22.8.94. M2664. CXC12C ADDED. HN.	
11 D	1.12.94 M2748 CXC818 ADDED. RFCB	
12 D	2.2.95. M2771. CXC1170 ADDED. HN.	

THIRD ANGLE PROJECTION.
DWG. COMPLIES WITH BS 308.
DIMNS. IN MILLIMETRES.
DWG No. 100A249

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